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ABSTRACT

This paper synthesizes issues related to the Internet, Internet curriculum materials (i.e., any type of teaching material or activity that can be incorporated into the K-12 curriculum and is available on the Internet), and constructivist learning theory; it explores the use of the Internet as a constructivist environment for learning and the ramifications of technology infused constructivism. Topics discussed include: the unfiltered nature of Internet curriculum materials; categorization of Internet curriculum materials; weaknesses, strengths, and unique aspects of Internet curriculum materials; possible review and evaluation standards for Internet curriculum materials; teacher resistance to new technology; alteration of student and teacher roles; constructivist learning theory; technology infused constructivism; and Internet curriculum materials in constructivist and objectivist classrooms. (DLS)

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# The Internet, Internet Curriculum Materials, and Constructivist Learning Theory

By Mike Tillman

This document will attempt to synthesize issues related to the Internet, Internet Curriculum Materials, and Constructivist Learning Theory. It will explore the use of the Internet as a constructivist environment for learning and the ramifications of technology infused constructivism. When I refer to Internet curriculum materials I am referring to any type of teaching material or activity that can be incorporated into K-12 curriculum and is available on the Internet. The material does not necessarily have to be a full fledged curriculum, in the vast majority of cases it is not.

## The Unfiltered Nature of Internet Curriculum Materials

Brunner (1995) suggests that much of what is on the Internet is undigested or unfiltered and "teachers and students have never before been exposed to information in such variety - not only by subject but in quality" (p. 14). He also believes that although many are worried about pornography on the Internet, the amount of misinformation on the Internet is much more dangerous. Other types of curriculum materials generally go through the process of being published. This means that somebody has to invest significant capital and generally that party will employ review and quality control mechanisms. On the Internet, anybody with spare time, an unsophisticated computer, and some very basic knowledge about the creation of an Internet home page can distribute Internet curriculum materials.

## Categorization of Internet Curriculum Materials

Categorization of Internet curriculum materials is almost as complex as categorizing the entire universe of curriculum materials. Internet curriculum materials may be free or fee-based; at this time almost all are free, but that will probably change in the future. They either include or exclude advertisements. The amount of advertising on private sector sites has and will continue to grow. A third way to group the materials is by format; some of the most obvious formats are textual, visual, auditory, motion picture, and multimedia. They may also be grouped according to whether or not they are interactive. Further distinctions may be drawn between materials that are fixed or stable, largely based on communication, or ongoing activities/projects. Numerous Internet curriculum materials fit neatly into the same categories designed for computer software: drill and practice, instructional, simulation, problem solving, and tutorial. However, Internet curriculum materials, as compared to most computer software, tend to be more useful for problem solving applications rather than drill and practice.

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Weaknesses, Strengths, and Unique Aspects of Internet Curriculum Materials

Weaknesses of the Internet and curriculum materials accessed through it include size, complexity of products and services, and cost. Bharat and Broder (1998) estimated that as of March 1998 there were at least 275 million distinct, static pages on the Web. They also estimated that the Web was growing at a rate of 20 million Web pages per month. Countless Internet services with numerous Internet packages claim they will make teachers' lives easier and more rewarding. The ever increasing and unpredictable cost factors include the high price of continuous technology training and maintenance, and the fact that the Internet is increasingly commercial and fee-based. Materials that are free today may cost money tomorrow. Over utilization and the accompanying slow reaction time is a problem, especially for the most popular sources during peak teaching hours.

Maddux (1994) sited a lack of coherent structure, stability, and documentation and a need to certify the quality of information. Honey (1994) states that the Internet was not designed with the K-12 community in mind and too often teachers' enthusiasm belies the reality of the resources available. A survey conducted by her also showed a need for well-designed, substantial, and relevant K-12 resources. Overly optimistic and simplistic views of "surfing the net" projected by the mass media only serve to heighten the misconceptions.

One of the strongest and most unique attributes of many Internet curriculum materials and the Internet as a teaching tool is the ability to communicate without being bound by time or distance restraints. The subset of the Internet which I am referring to is Electronic Mail (E-mail). E-mail is a system that allows a computer user to exchange messages with other computer users (or groups of users) through a communications network. It allows the user to be reflective, emphasizes authentic writing, and encourages the participation of those who might not otherwise participate. Electronic discussion groups accessed via E-mail facilitate an exchange of topic specific information and dialogue.

E-mail is a representative subset of technological literacy. The vast majority of educators accept the notion that technological literacy is a laudable goal. However, technological literacy differs from other types of literacy. Uhlig (1983) suggests "technological literacy, unlike some other kinds of literacies, is not an event; it is a continuous process" (p. 2). In other words it is a process that must be continually constructed by both teachers and students. State technology curriculum guides are beginning to stipulate that students should achieve technological literacy. It appears as if decision makers intend to emphasize the need to prepare students for a society that will change rapidly and that will place a greater emphasis on the ability to access rather than internalize information. The Internet certainly has the potential to be used as teaching tool that will help students achieve such a goal.

Other strengths of the Internet and curriculum resources accessed through it include the ability to communicate socially and academically with others that have different economic, racial, or geographic backgrounds. Students can improve second language skills by conversing with native

speakers. There are also numerous opportunities to publish electronically and to participate in real science like the National Geographic Kids Network Acid Rain Project, in which the federal government actually used data students collected. Currency is another major strength, especially when compared to a traditional textbook which is sold for up to eight years after it was originally planned. Many of the above provide ample opportunities for authentic experiences and assessment. Students are also given an opportunity to construct and distribute content. According to Salvador (1994) many educators would argue that the true value of the Internet lies not in the ability to connect students to content, but in the ability to let students create and share content themselves.

Another unique aspect of the Internet is the sheer amount of curriculum resources it can and eventually will provide access to. The National Digital Library plans to digitize 5 million items and place them on the Internet by the year 2000. Additionally, this particular Internet curriculum source will be unique in that it will provide unheard of access to primary source materials. Many of the items in this particular project will be primary source materials related to American history and culture. One of the central purposes of the project will be to improve critical thinking through presenting students with source materials and letting them reach their own conclusions rather than having them read somebody else's interpretation. Yet another unique aspect of the Internet is the dimension of human interaction that is a part of the Internet and was not a part of proceeding technologies.

Possible Review and Evaluation Standards for Internet Curriculum Materials

After spending several hundred hours surfing the Internet for curriculum materials I have reached the conclusion that there are literally thousands of high quality curriculum materials available via the Internet. There are also thousands of low quality curriculum materials available via the Internet. At this point there is not an efficient and effective method to separate the good from the bad. Based on the seven years I spent as a K-12 classroom teacher, I believe the good Internet curriculum materials have the potential to change and improve education. However, this process will not be as smooth as some make it sound. Many are trying to make teachers believe that accessing and incorporating these curriculum materials will be easy. It will not. Successful utilization of the Internet will be time consuming.

Many teachers don't incorporate Internet curriculum materials because of the lack of information about them and the lack of evaluation standards for them. Because of the time and energy required to access Internet curriculum materials it is unlikely that the needed information will come from practicing K-12 teachers. By and large, commercial services that summarize and rate large numbers of Internet home pages provide only cursory coverage of Internet curriculum materials.

Review and evaluation standards for general Internet resources are being developed; however, the lack of review and evaluation standards for Internet curriculum resources is acute. There is a need

for a comprehensive listing of review and evaluation standards that is broad enough to cover the variety of Internet curriculum materials available. The standards should be culled from review and evaluation standards for general Internet resources and traditional curriculum resources like books, computer software, media, etc. They should address the unique qualities and capabilities of

Internet curriculum materials. A survey of presently available review and evaluation standards for Internet curriculum materials revealed a core listing of items that should be included when reviewing or evaluating Internet curriculum materials: 1. title; 2. Internet address; 3. source; 4. authority of the source; 5. subject 6. objective; 7. summary; 8. organization methodology; 9. format (textual, audio, visual, etc.); 10. age/grade level; 11. special features (opportunities for interactive learning, collaboration, etc.); 12. details of how the source might support and/or enrich existing K-12 curriculum; 13. independence level; 14. uniqueness; 15. cost; 16. frequency of updating (if appropriate); and 17. overall rating.

Teacher Resistance to New Technology

The literature and my own experiences have made it clear that some teachers resist technology. Coulson (1971) found that teacher enthusiasm for computer use was directly proportional to the amount of work it did for them and inversely proportional to the amount of time they were expected to invest. Telling teachers that technology will make them more effective is not in and of itself a sufficient motivator. They must also be sold on the fact that technology has the potential to save them time; in the end, it will make their job easier.

Research conducted in the early eighties concluded that teachers limit their search for curriculum materials to those that are immediately available. The research also indicated that they spend relatively little time engaged in the process of materials selection. I suspect you would find similar findings today. These curriculum selection and evaluation practices may not have been as much of a problem in the past, when textbooks were used to deliver the vast majority of the curriculum. But today if such behaviors persist, it isn't hard to understand why teachers resist the most selection and evaluation intensive curriculum resources available to them: Internet curriculum materials.

Another reason teachers may resist the latest technology (the Internet) is that they have already experienced the excessive hype associated with numerous other types of technology. Hannafin and Savenye (1993) concluded "each technological breakthrough in the past resulted in disappointment followed by disillusionment and eventually abandonment" (p. 26). The strongest resistance to the latest technology (The Internet) will probably come from teachers that have been teaching a long time and therefore have repeatedly experienced the excessive hype, disappointment, disillusionment, and abandonment cycle.

Alteration of Student and Teacher Roles

The Internet and curriculum materials available on it will most assuredly impact student roles and activities. In the past many students had trouble finding enough information on the topic they were researching. With the Internet students often end up with far too much information. There will be an increased emphasis on figuring out how to eliminate information which, will in turn, increase the value of critical thinking (Brunner, 1995).

A significant number of the materials I have found on the Internet are based on an ongoing project or continuing communication between people at distant locations. These types of materials place an emphasis on the written word. The Internet and the types of activities it encourages have the potential to improve writing skills. I have been an active user of the Internet for about six years and I find that a lot of what I used to do via the spoken word I now do via the written word. If the Internet forces students to write more I believe it will have a positive effect on the quality of their writing.

Teacher roles and activities will also be impacted. According to Brunner most teachers have been trained to "help kids move, through explanations, from a place of ignorance and confusion to a place of greater clarity and knowledge" (p. 15). In the future he believes teachers will need to help kids understand why different interpretations make sense for different kinds of people. Teachers will need to help students learn how to use a wide variety of information to make their own meaning and form their own opinions. Wilson (1997) identified several ways in which teacher roles will change due to technology infused constructivism. Teachers will have to relinquish control of the learning citation and the respective classroom roles of the teacher and student will merge. Time spent on individual instruction will increase; time spent on whole group instruction will decrease.

Constructivist Learning Theory

Successful utilization of the Internet and Internet Curriculum Materials will require teachers and students to become more comfortable with constructivist-based teaching and learning. Zohorik (1995) states that numerous studies during the seventies and eighties concluded that learning, as evidenced by standard achievement test score gains, was most likely to take place under circumstances that could best be labeled direct instruction. According to the research, if reproduction of factual knowledge or well-defined skills was the main objective, direct instruction was the most effective methodology. However, if the goal was to facilitate understanding, thinking, and creativity, Zahorik believes direct instruction to be of little value. He states that teaching which emphasizes thinking, understanding, and self-control of behavior could best be labeled constructivist teaching. Scaffolding; modeling; and tasks that are authentic, holistic, long-term, and social are a big part of constructivist instruction. Constructivist teaching empowers students in a way that allows them to construct their own knowledge rather than reproduce somebody else's.

Similarly, Hannafin and Savenye (1993) concluded that "The teacher's role, then, can be viewed as a continuum. At one end is the role of traditional lecturer and imparter of knowledge, while at the other end is the role of coach, observer and facilitator" (p. 28). They labeled teachers at the traditional end of the spectrum objectivist. Teachers at the other end of the spectrum were labeled constructivist. Objectivist teachers operate under the assumption that knowledge exists in discrete chunks that can be transferred from the teacher's head to the student's. Hannafin and Savenye believe that the nature of teaching with technology will help bring about student responsibility for learning, lead to less teacher directed learning, and increase instructional activities where the main focus is constructing something.

Technology Infused Constructivism

As compared to most other curriculum materials, Internet curriculum materials tend to be specifically well suited for self-paced, open-ended problem solving. The Internet has created a world where an endless amount of information on every conceivable topic is available to all. Nicaise and Barnes (1996) believe technology can facilitate constructivist methodologies through helping teachers create information-rich environments that allow students to explore and construct meaning. They also believe technology will promote higher-level thinking because students will spend less time looking for information and more time analyzing it. Individualization will be facilitated by computer software. Task authenticity will be increased by public showcasing of students' work on the Internet.

As mentioned earlier, the true value of the Internet is not the content it provides but its ability to facilitate student creation/construction of knowledge that can be shared. Because of technology in general and the Internet in particular, Thornberg (1994) suggests that "students will move away from the test-preparation business to building information products that can really be used by clients all over the world." He believes that "teachers must become brokers that help students connect to others on the Internet that will help the students create and add to their knowledge."

Internet Curriculum Materials In Constructivist and Objectivist Classrooms

Curiosity about the relationship between the Internet, Internet curriculum materials, and constructivist learning theory prompted the writing of this document. Based on my understanding of Internet curriculum materials and constructivist learning theory, and comments and ideas expressed throughout this document, I believe those who advocate utilization of Internet curriculum materials would also advocate utilization of constructivist teaching methodologies. Over and over again Internet curriculum materials have been touted as a curriculum source that facilitates instructional tasks that are authentic, holistic, long-term, divergent, constructive, and social. I have reached the conclusion that the unique characteristics of the Internet will impact education practice, specifically with regards to the amount of constructivist instruction that takes place in the schools. The role that the Internet will play in future educational practices is

undeniable.

However, the Internet, as presently framed by its most vocal advocates, will primarily be of benefit to constructivist educators and students who learn best via constructivist methodologies. I wonder if teaching methodologies will have to skew towards the constructivist end of the spectrum in order to utilize the benefits of Internet curriculum materials. There are many objectivist teachers out there. There are also students that learn best via the objectivist route and subjects that are taught best from the objectivist perspective. I believe many promoters of the Internet are ignoring the fact that much of what goes on in the classroom is objectivist-based instruction, and to a certain degree, always will be. There is a need for an organizational system that will allow objectivist teachers to effectively and efficiently integrate high quality Internet curriculum materials into their lessons. I hope that promoters of the Internet will reach this realization and facilitate instructional improvement in both objectivist and constructivist learning environments.

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